Notebook, N-05-08-24.1

August 24, 1908.

Endurance Test of "A" Type Cells.

Eighteen A4 cells, made regularly in S.B. factory, all contain —

#728 Ni(OH)$_2$
#24 Ni Flake
#952 Fe Mix

Cells were filled with an electrolyte of 21 % KOH containing 11.4 grams of SiOH per liter, and given three or four regular runs in the Testing Department.

Fresh electrolyte was then put in and cells were sent to the stock room where they stood for ^ days.

They were then sent to the Laboratory where new solutions were added to cells to make the following electrolytes:

Electrolytes in which cells will be tested for endurance

See Note in Back

A4 #210	12 %	KOH	saturated	with	SiOH
213	"	"	"	"	"
211	15 % KOH		"	"	"
214	"	"	"	"	"
212	18 % KOH		"	"	"
215	"	"	"	"	"
216	21 %	KOH	+ 15 g.	SiOH	per Cell
217	"	"	"	"	"
218	"	"	30 g. SiOH		"
219	"	"	"	"	"
220	"	"	45 g. SiOH		"
223	"	"	"	"	"
224	"	"	60 g. SiOH		"
225	"	"	"	"	"
226	"	"	75 g. SiOH		"
228	"	"	"	"	"
229	24 %	KOH	+ 45 g.	SiOH	per Cell
230	"	"	"	"	"

Dr. Grothe mixed solutions, for cells #210 - 215, which, when added to the 333 cc of regular electrolyte con tained in the pores of the plates, would make the required electrolyte in each cell. These electrolytes cannot be just right however, because the regular electrolyte which was removed from the cells varied in Sp. Gr. and also was not as strong as it should have been. It was:

In	#210	1.192	Sp. Gr.	at	26°C.
"	211	1.184	"	"	"
"	212	1.180	"	"	"
"	213	1.200	"	"	"
"	214	1.201	"	"	"
"	215	1.202	"	"	"

See Note in Back

The 1000 cc of solution mixed by Dr. Grothe to add to each cell contains amounts of KOH and $LiOH$ as follows:

For 12% KOH saturated with $LiOH$ — 70 g. KOH and 105 g. $LiOH$ (850 cc 12.4 g. $LiOH$).

For 15% KOH saturated with $LiOH$ — 140 g. KOH and 99 g. $LiOH$ (800 cc 12.4 g. $LiOH$).

For 18% KOH saturated with $LiOH$ — 214 g KOH and 94 g. $LiOH$ (760 cc 12.4 g. $LiOH$).

There was a slight excess of $LiOH$ in each of these solutions (#210-215) as mixed.

The electrolytes for cells #218-228 were made up by adding dry $LiOH$ (97%) to fresh regular solution.

Fresh regular solution (21% KOH + 11.4 g. $LiOH$ per liter) was put in cells #216-217.

1000 cc of 25% KOH containing 41.2 g. of $LiOH$, was substituted for the same amount of regular solution in #229 and in #230 to make the required electrolyte.

#210-215 were given the 1st charge immediately after filling with the new electrolyte.

#216-230 stood 54 hrs. after filling, before putting on charge.

W.E.H.

A4 Cells #210-212.

DATE	TIME	MIN.	AMPS	VOLTS			TEMP.			REMARKS.
				210	211	212	210	211	212	
				Charge #1						
8/20/08	A.M. 10.25	0	30	on charge						
8/21	A.M. 1.25	900	"	1.83	1.815	1.82	93.2	95	93.4	
				Discharge #1						
8/21	A.M. 1.28	—	open	1.567	1.562	1.562				
	1.30	0	30	1.48	1.477	1.475				
	.32	2	"	1.40	1.40	1.40				
	.35	5	"	1.365	1.367	1.372				
	.40	10	"	1.34	1.342	1.345				
	.50	20	"	1.307	1.317	1.32				
	2.00	30	"	1.28	1.28	1.282				
	.10	40	"	1.26	1.262	1.262				
	.30	60	"	1.242	1.243	1.247				
	.50	80	"	1.203	1.205	1.207				
	3.10	100	"	1.182	1.19	1.19				
	.30	120	"	1.16	1.165	1.165				
	.50	140	"	1.14	1.152	1.152				
	4.10	160	"	1.12	1.142	1.145				
	.30	180	"	1.10	1.12	1.125				
	.50	200	"	1.065	1.10	1.105				
	5.10	220	"	1.02	1.06	1.09				
	.20	230	"	1.017	1.057	1.065				
	.25	235	"	1.005	1.047	1.06				
	.27	237	"	1.00						-118.5

DATE	TIME	MIN.	AMPS	VOLTS			TEMP.			REMARKS
				210	211	212	210	211	212	
8/21/08	A.M. 5.30	240	30	.998	1.04	1.057				
	.40	250	"	.987	1.023	1.037				
	.50	260	"	.975	1.007	1.017				
	6.00	270	"	.957	1.00	1.00				-135
	.10	280	"	.92	.98	.98				
	.20	290	"	.87	.96	.962				
	.30	300	"	.815	.92	.945				
	.35	305	"	.76	.892	.932				
	.40	310	"	.58	.81	.90				
	.40½	310½	"	.50						
	.45	315	"		.75	.88				
	.50	320	"		.64	.837				
	.52	322	"		.50					
	.55	325	"			.75				
	7.00	330	"			.642				

A4 #210-212.

DATE	TIME	MIN	AMPS	VOLTS 210	VOLTS 211	VOLTS 212	TEMPERATURE 210	TEMPERATURE 211	TEMPERATURE 212	TEMPERATURE Idle	REMARKS
				Charge			#2.				
8/21/08	A.M. 8.05	0	30	on charge			92.5	95	92	75	
	11.05	180	"				90	91	89.3	76.5	
	P.M. 2.05	360	"				92	92.2	91.2	79	
	5.05	540	"				97.7	98.5	97	82	
	8.05	720	"				98.2	100	98	81.7	
	11.05	900	"	1.84	1.835	1.837	94.7	96.3		78.3	
				Discharge #2.							
8/21	P.M. 11.08	—	open	1.59	1.575	1.577					
	11.10	0	30	1.50	1.497	1.497					
	.12	2	"	1.42	1.425	1.427					
	.15	5	"	1.382	1.385	1.393					
	.20	10	"	1.347	1.355	1.357					
	.30	20	"	1.32	1.32	1.32					
	.40	30	"	1.297	1.30	1.30					
	.50	40	"	1.29	1.292	1.292					
8/22	A.M. 12.10	60	"	1.262	1.26	1.25	93	95	93.2	77.3	
	.30	80	"	1.24	1.24	1.237					
	.50	100	"	1.21	1.217	1.215					
	1.10	120	"	1.197	1.20	1.20	92.2	94	92	77	
	.30	140	"	1.175	1.18	1.177					
	.50	160	"	1.155	1.162	1.16					
	2.10	180	"	1.127	1.145	1.143	93	94	92.5	77	
	.30	200	"	1.102	1.125	1.125					

DATE	TIME	MIN.	AMPS.	VOLTS 210	VOLTS 211	VOLTS 212	TEMP. 210	TEMP. 211	TEMP. 212	TEMP. Idle	REMARKS
8/22/08	A.M. 2.50	220	30	1.08	1.105	1.105					
	3.10	240	"	1.05	1.083	1.087	94	95.7	94.3	77	
	.20	250	"	1.03	1.07	1.08					
	.30	260	"	1.02	1.06	1.062					
	.40	270	"	1.007	1.04	1.055					
	.45	275	"	1.002	1.037	1.042					
	.50	280	"	1.00	1.022	1.04					-140.
	.55	285	"	.995	1.017	1.025					
	4.00	290	"	.98	1.00	1.018					-145
	.05	295	"	.967	.98	1.00					-147.5
	.10	300	"	.955	.965	.985	96	98.5	97.5	77.2	
	.20	310	"	.88	.88	.96					
	.23	313	"		.50						
	.25	315	"	.50		.925					
	.30	320	"			.84					
	.33	323	"			.635	100.7	103	97.7	77.2	

Stood 109 hours.
See third run of the entire
lot of Endurance Cells on the
11th page following.

A4 #213-215.

DATE	TIME	MIN.	AMPS	VOLTS			TEMP			REMARKS
				213	214	215	213	214	215	
				Charge			#1			
8/21/08	P.M. 2.25	0	30		on charge					
8/22	A.M. 5.05	880	"	1.80	1.90	1.80				
				Discharge			#1			
8/22	A.M. 5.08	–	open	1.57	1.57	1.565				
	5.10	0	30	1.48	1.48	1.48				
	.12	2	"	1.405	1.405	1.40				
	.15	5	"	1.38	1.38	1.38				
	.20	10	"	1.35	1.357	1.36				
	.30	20	"	1.30	1.31	1.32				
	.40	30	"	1.28	1.29	1.30				
	.50	40	"	1.26	1.265	1.275				
	6.10	60	"	1.235	1.24	1.24				
	.30	80	"	1.205	1.217	1.205				
	.50	100	"	1.18	1.182	1.18				
	7.10	120	"	1.16	1.17	1.17				
	.30	140	"	1.15	1.155	1.15				
	.50	160	"	1.13	1.14	1.13				
	8.18	188	"	1.097	1.095	1.082				
	.30	200	"	1.065	1.095	1.08				
	.50	220	"	1.035	1.065	1.042				
	9.10	240	"	1.005	1.03	1.005				
	.15	245	"	1.005	1.022	1.002				
	.17	247	"			1.00				-123.5

DATE	TIME	MIN.	AMPS.	VOLTS			TEMP.				REMARKS
				213	214	215	213	214	215	Idle	
8/22/08	A.M. 9.20	250	30	1.002	1.02	.997					
	.21	251	"	1.00							-125.5
	.25	255	"	.997	1.01	.99					
	.30	260	"	.997	1.01	.985					
	.35	265	"	.997	1.002	.982					
	.37	267	"		1.00						-133.5
	.40	270	"	.985	.997	.97					
	.45	275	"	.982	.99	.965					
	.50	280	"	.977	.98	.957					
	.55	285	"	.967	.97	.945					
	10.00	290	"	.96	.96	.937					
	.05	295	"	.942	.94	.92					
	.10	300	"	.92	.902	.895					
	.15	305	"	.87	.815	.837					
	.20	310	"	.81	.66	.837					
	.21	311	"		.50						
	.25	315	"	.55		.735					
	.26	316	"	.50							
	.30	320	"			.60					
	.32	322	"			.50					

Stood over Sunday - 46 hrs.

A4 #213-215.

DATE	TIME	MIN.	AMPS.	VOLTS			TEMP.				REMARKS
				213	214	215	213	214	215	Idle	
				Charge #2.							
8/24/08	A.M. 8.40	0	30	on chg.			76	76	76	75.7	
	11.40	180	"				86.2	86.5	86	75.8	
	P.M. 2.40	360	"				94.2	94.7	93.2	79	
	5.40	540	"				102.5	103	100.2	82.7	
	8.40	720	"				103.7	104	101	83	
	11.40	900	"	1.83	1.837	1.83	103	102.5	99	82.2	
				Discharge #2.							
8/24	P.M. 11.43	–	open	1.582	1.582	1.582					
	11.45	0	30	1.47	1.462	1.47					
	.47	2	"	1.41	1.415	1.41					
	.50	5	"	1.38	1.38	1.382					
	.55	10	"	1.365	1.36	1.362					
8/25	A.M. 12.05	20	"	1.34	1.33	1.34					
	.15	30	"	1.315	1.31	1.315					
	.25	40	"	1.30	1.297	1.30					
	.45	60	"	1.265	1.26	1.265	100.5	100	97	81	
	1.05	80	"	1.24	1.237	1.24					
	.25	100	"	1.22	1.217	1.22					
	.45	120	"	1.202	1.197	1.20	100	99.7	95.5	80	
	2.05	140	"	1.18	1.175	1.18					
	.25	160	"	1.16	1.157	1.16					
	.45	180	"	1.14	1.137	1.14	99	98	94.5	79	
	3.05	200	"	1.12	1.115	1.12					

DATE	TIME	MIN.	AMPS.	VOLTS.			TEMP.				REMARKS.
				213	214	215	213	214	215	Idle	
8/25/08	A.M. 3.25	220	30	1.08	1.085	1.09					
	.45	240	"	1.05	1.06	1.06	997	99	95	79	
	4.05	260	"	1.03	1.037	1.03					
	.10	265	"	1.02	1.022	1.02					
	.25	280	"	1.015	1.015	1.013					
	.30	285	"	1.003	1.00	1.003					– 142.5
	.35	290	"	1.00		1.00					– 145
	.45	300	"	.982	.98	.99	102	101	97	78.5	
	5.05	320	"	.81	.845	.967					
	.08	323	"	.50							
	.09½	324½	"		.50						
	.15	330				.86					
	.25	340				.76					
	.30	345				.50			101.7		

Stood 36 hours.
See third run of the entire lot of Endurance Cells on the 7th page following

A 4 #210 - 230.

DATE	TIME	MIN.	AMPS.	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS.
								Charge #1.														
8/24/08	P.M. 5.25	0	30		on charge																	
8/25	A.M. 8.25	900	"	—	—	—	—	—	—	1.81	1.802	1.80	1.81	1.80	1.805	1.805	1.80	1.795	1.795	1.785	1.787	
								Discharge #1														
8/25	A.M. 8.28	—	open							1.555	1.555	1.555	1.555	1.557	1.557	1.56	1.555	1.555	1.555	1.547	1.55	
	8.30	0	30		Cells #210 - 215 had					1.47	1.46	146	146	1.46	1.455	1.46	1.45	1.445	1.445	1.445	1.45	
	.32	2	"	two runs on the board						1.395	1.39	1395	1.39	1.39	1.385	1395	1395	1.39	1.39	1.39	1.395	
	.35	5	"	before the rest of the						1.367	1.367	1.365	1362	1.36	1.362	1365	1.365	1.362	1.362	1.365	1.37	
	.40	10	"	Endurance Cells were						1.35	1347	1.345	1.342	1.342	1.342	1342	1.342	1342	1.34	1.342	1.35	
	.50	20	"	started. They are						1.315	1.317	1.315	1.31	1.315	1.305	1312	1.315	1.31	1.315	1.317	1.317	
	9.00	30	"	now standing to						1.293	1.292	1.285	1.285	1.285	1.28	1.285	1.283	1.282	1.282	1.283	1.295	
	.10	40	"	allow the others to						1.27	1.27	1.265	1.267	1.265	1.26	1.26	1.26	1.26	1.262	1.26	1.267	
	.30	60	"	catch up.						1.237	1.235	1.23	1.23	1.232	1.227	1.23	1.23	1.23	1.232	1.23	1.232	
	.50	80	"							1.215	1.212	1.21	1.21	1.21	1.205	1.21	1.205	1.207	1.205	1.205	1.21	
	10.10	100	"							1.195	1.192	1.19	1.19	119	1.182	1.185	1.185	1.187	1.187	1.182	1.187	
	.31	121	"							1.18	1.177	1.175	1.172	1.172	1.165	1.167	1.17	1.17	1.172	1.172	1.17	
	.50	140	"							1.17	1.165	1.162	1.157	1.157	1.152	1.157	1.16	1.157	1.16	1.16	1.16	
	11.10	160	"							1.15	1.147	1.147	1.142	1.14	1.135	1.14	1.145	1.15	1.15	1.15	1.15	
	.30	180	"							1.14	1.14	1.14	1.13	1.13	1.125	1.127	1.135	1.137	1.135	1.14	1.14	
	.50	200	"							1.135	1.135	1.135	1.122	1.122	1.112	1.117	1.13	1.13	1.125	1.13	1.13	
	12.10	220	"							1.12	1.117	1.122	1.105	1.102	1.097	1.105	1.115	1.12	1.12	1.12	1.117	
	.30	240	"							1.107	1.10	1.11	1.08	1.08	1.07	1.077	1.097	1.102	1.09	1.10	1.105	
	.40	250	"							1.095	1.092	1.097	1.07	1.065	1.06	1.06	1.077	1.09	1.08	1.095	1.092	
	.50	260	"							1.08	1.077	1.082	1.05	1.047	1.04	1.04	1.072	1.077	1.065	1.085	1.08	

DATE	TIME	MIN.	AMPS.	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
8/25/08	1.00	270	30							1.07	1.062	1.072	1.035	1.036	1.03	1.03	1.055	1.062	1.052	1.072	1.072	
	.10	280	"							1.05	1.045	1.057	1.012	1.012	1.012	1.01	1.037	1.047	1.037	1.057	1.057	
	.16	286	"													1.00						- 143
	.17	287	"												1.00							- 143.5
	.17½	287½	"										1.00	1.00								- 143.7
	.20	290	"							1.03	1.03	1.04	.99	.99	.99	.99	1.017	1.027	1.012	1.04	1.035	
	.28½	298½	"														1.00		1.00			- 149.2
	.30	300	"							1.00	1.01	1.022	.97	.97	.972	.97	.997	1.005	.997	1.02	1.017	- 150
	.32	302	"															1.00				- 151
	.33	303	"								1.00											- 151.5
	.35	305	"																		1.00	- 152.5
	.37	307	"									1.00								1.00		- 153.5
	.40	310	"							.932	.972	.99	.92	.932	.941	.925	.96	.97	.97	.99	.985	
	.50	320	"							.66	.90	.952	.805	.817	.877	.82	.882	.90	.915	.952	.942	
	.52½	322½	"							.50												
	.58	328	"										.50									
	.58½	328½	"											50								
	2.00	330	"							—	.67	.817	—	—	.745	.45	50	57	.772	.867	.835	
	.01	331	"															50				
	.02½	332½	"								50											
	.03½	333½	"												50							
	.04	334	"																50			
	.06½	336½	"									.50										
	.07	337	"																		30	- 168.5
	.08	338	27																	66		
								Charge #2.														
8/25	P.M. 5.25	0	30	on charge																		
8/26	A.M. 8.25	900	"	—	—	—	—	—	—	1.80	1.810	1.802	1.80	1.80	1.80	1.802	1.797	1.797	1.797	1.797	1.80	
								Discharge #2														
8/26	A.M. 8.28	—	open							1.575	1.55	1552	155	1552	1555	1557	155	155	155	1545	155	
	8.30	0	30							1.48	147	1465	146	146	1455	1462	146	14.6	1455	1455	1455	
	.32	2	"							1.395	13.9	139	139	1392	1385	1397	1397	1397	1395	139.5	1397	
	.35	5	"							1.375	137	1365	1365	137	1365	1377	1375	1375	1375	1375	1377	

DATE	TIME	MIN.	AMPS	210	213	211	214	212	215	216	217		218	219	220	223	224	225	226	228	229	230	REMARKS.
8/26/08	A.M. 8.40	10	30							1355	1355		1352	135	1355	1345	136	136	1357	1355	1355	136	
	.50	20	"							1.32	1327		1325	1325	1325	132	133	133	1325	1325	1322	1327	
	9.00	30	"							1.30	1.30		1.297	1.30	130	1.292	130	1.30	1.30	1.30	1.30	1.30	
	10	40	"							128	128		1.275	128	128	1272	128	128	128	1277	1275	1277	
	30	60	"							1255	1252		125	125	125	1245	125	125	125	125	1245	125	
	50	80	"							1237	1232		123	1232	123	1222	1227	1227	1225	1227	122	1225	
	10.10	100	"							1222	122		1217	1212	1212	1207	121	121	1207	1205	1205	121	
	.30	120	"							121	1207		1202	120	1192	119	119	119	119	119	1185	119	
	.50	140	"							1192	1192		1185	1185	1177	117	1177	1177	1177	1175	1172	1175	
	11.10	160	"							1177	1177		1172	117	1167	116	116	116	116	1162	1162	1165	
	.30	180	"							117	1165		116	116	1152	115	1152	1157	1155	1152	1155	1155	
	.50	200	"							1155	1152		115	115	1142	1137	1137	114	1142	1137	114	1142	
	12.10	220	"							114	1137		1137	1132	1125	112	1122	113	113	112	1125	1127	
	30	240	"							1122	1112		1117	110	110	1097	1097	1102	111	110	1102	1107	
	.50	260	"							1092	1072		1.085	1.06	1067	107	107	1077	1082	1077	1.08	1.082	
	1.00	270	"							1037	1.00		1.01	.997	10.1	1017	102	1027	1042	103	1.04	1.04	- 135
	.01	271	"																				
	.03	273	"										100										- 135.5
	.04	274	"												100								- 136.5
	.05	275	"													10.0							- 137
	.06	276	"							100							1.00	1.00					- 137.5
	.07	277	"																	100			- 138
	.07½	277½	"																		1.00	1.00	- 138.5
	.09	279	"								50			50					100				- 138.7
													50										
	.10	280	"																				
	.12½	282½	"							.76					78	885	90	85	93	925	91	90	
	.13	283	"							50					50								
	.14½	284½	"															50					
	.15½	285½	"													50						50	
	.16	286	"																50	50			
	.16½	286½	26																		50		- 143
																	55						

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
								Charge #3														
8/26/08	PM 5.25	0	30	75.5		76.		76		83		85.5		86		83.7		85.2		85		Temp. Reading
	8.25	180	"	86.2		87		88		90		92.5		93		91		92.2		92.2		" "
	11.25 AM	360	"	90.2		90.7		93		96		99		99		97.2		99		99.4		" "
8/27	2.25	540	"	94.2		96.7		99		100		1.03		1.03		1.013		1.03		1.03		" "
	5.25	720	"	98.7		1.016		1.025		1.037		1.07		1.077		106		1.075		1.067		" "
	8.25	900	"	97.5		1.01		1.03		1.027		1.056		1.065		1.057		106		1055		" "
	8.25	"	"	1822	1822	182	182	1817	1817	1795		179	179	1795	180	180	180	1805	1805	1805	1805	P.D. Reading
								Discharge #3														
			open	158	158	1575	1575	157	1565	1555	1545	154	1545	1545	155	155	156	1555	156	156	1555	
8/27	8.30	0	30	149	149	148	148	148	147	146	146	1455	145	1457	1455	146	146	146	146	1455	146	
	.32	2	"	141	141	141	141	1415	1407	141	140	140	1402	140	140	1405	1407	141	1405	140	1415	
	.36	6	"	138	138	138	138	138	1382	138	1375	1377	1375	138	1377	1382	1385	1385	1382	1382	1382	
	.40	10	"	1362	1365	1365	137	137	1365	136	137	1362	136	1362	1367	137	1375	1367	1365	1365	1375	
	.50	20	"	1342	1342	1342	1342	1347	1342	1337	1337	1337	1337	134	1337	1342	1342	1345	1342	134	134	
	9.00	30	"	1322	132	132	132	1322	132	132	1307	131	1305	1315	1305	132	132	132	132	132	132	
	.10	40	"	130	1302	1202	130	1305	130	1285	1285	1285	129	1297	1285	130	130	130	130	1297	130	
	.30	60	"	95.5		100		101		99.7		1.025		1032		1002		1025		1027		Temp Reading
	.30	60	"	127	1277	1277	1275	128	1275	127	1262	1262	1262	126	126	127	127	127	127	1262	1265	P.D Reading
	.50	80	"	1245	1252	1255	1252	1252	125	1245	1242	124	124	124	1232	1242	1245	1242	124	1237	124	
	10.10	100	"	122	1232	1232	1232	1232	123	123	1227	1222	122	1217	1215	122	122	122	122	1212	1217	
	.30	120	"	96		1.00		1002		99		99		100		96.5		98.5		99.5		Temp Reading
	.30	120	"	1202	1212	120.5	121	121	1207	1212	1212	1207	1205	1205	1197	1202	1202	1202	120	1192	1202	P.D Reading
	.50	140	"	118	1197	1197	120	120	1192	1207	1207	1192	1192	119	118	119	119	119	119	118	1187	

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
8/27/08	A.M. 11.10	160	30	116	118	1182	1182	1182	1177	1192	1192	1187	118	1175	1172	1172	1177	1172	1172	117	1175	
	30	180	"	96		997		100		982		101		1.005		98		972		97.5		Temp Reading
	30	180	"	1137	116	1162	1165	1162	1157	1177	1177	1172	117	1165	1157	116	1162	1162	1162	1157	116	P.D. Reading
	50	200	"	1112	114	1142	115	1147	114	117.	117	1165	116	1152	1147	115	1152	1152	115	1147	1152	
	P.M. 1210	220	"	1087	1127	1125	1122	1122	1117	116	1155	1152	1147	1142	1122	1135	1142	114	1135	1135	1137	
	30	240	"	977		1007		1005		992		101		98		972		97		977		Temp Reading
	30	240	"	106	1102	1105	1112	1112	1097	1145	114	114	1122	1127	1117	112	1122	112	112	112	1125	P.D. Reading
	50	260	"	105	108	109	1095	1095	1077	1125	1115	112	111	1107	1105	1102	1112	111	1102	1102	1112	
	1.00	270	"	1.04	1.072	1.077	1.085	1.085	1.07	1.11	1.092	1.102	1.092	1.092	1.09	1.092	1.102	1.10	1.097	1.10	1.105	
	.10	280	"	1.032	1.06	1.067	1.07	1.07	1.052	1.07	1.00	1.052	1.052	1.077	1.072	1.085	1.09	1.092	1.092	1.09	1.095	
	.14	294	"									1.00										-140
	.15	295	"																			-142
	.15½	295½	"										1.00									-142.5
	.18	298	"							1.00												-142.7
	.20	290	"									.50										
	.20½	290½	"							50			.50									
	.21	291	"	1.022	1.05	1.057	1.062	1.062	1.045					1.032	1.032	1.072	1.077	1.082	1.072	1.075	1.082	
	.24½	294½	"											1.00								-147.2
	.25½	295½	"												1.00							-147.7
	.30	300	"	1.017	1.04	1.05	1.052	1.052	1.04					.605	.79	1.04	1.037	1.062	1.042	1.037	1.055	
	.30½	300½	"											.50								
	.32	302	"																			
	.34½	304½	"												.50							
	.35	305	"														1.00					-152.2
	.36	306	"																	.99		-152.5
	.37	307	"																1.00			-153
	.37½	307½	"													1.00						-153.5
	.40	310	"	1.01	1.032	1.04	1.04	1.045	1.037												1.00	-153.7
	.44	314	"	1.00												.95	.40	1.017	.91	.65	.922	
	.46½	316½	"															1.00	.50			-157
	.50	320	"	.985	1.01	1.02	1.017	1.03	1.02							.50					.0	
	.55½	325½	"		1.00		1.00											50				
	.59½	329½	"			1.00																-162.7
	2.00	330	"	.96	.987	.998	.985	1.01	1.01													-164.7
	.04	334	"					1.00	1.00													
	.10	340	"	.89	.932	.962	.92	.98	.982													-167
	.20	350	"	.48	.52	.87	.56	.97	.972													

DATE	TIME	MIN.	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
8/27/08	2.24	354	30			50																
	2.30	360	"					50	.782													
	.31	361	7.4						.78													
								Charge #4.														
8/27/08	P.M. 4.55	0	30	90.5		93.5		93		86.5		88		89		877		88.5		89		Temp. Reading
	7.55	180	"	93.5		96.5		96.2		97.7		95		95.5		95		96.2		96		" "
	10.55	360	"	927		957		96		963		98.5		99		98.2		100		100.2		" "
8/28	A.M. 1.55	540	"	98		1002		101.		1002		102		1025		1027		105		105		" "
	4.55	720	"	98		1.045		1026		101		104		105		103		1055		1055		" "
	7.55	900	"	97		101		103		1007		1032		103		1.02		1.043		104		" "
	7.55	900	"	185	184.5	184	184	183	1835	181	1807	1807	181	182	182	1825	183	182	182	182	182	P.D. Reading
								Discharge #4														
	7.58 AM		open	1602	160	1595	159	1585	1585	157	1565	157	157	158	1577	158	1577	158	158	1575	158	
8/28	8.00	0	30	150	150	149	149	1485	148	1465	1465	1465	146	1465	1462	147	1465	147	147	1462	1467	
	.02	2	"	142	142	142	142	142	1422	1407	1405	1435	1405	141	1405	1415	1416	142	142	1415	1417	
	.05	5	"	1385	1385	1385	1385	138	139	1385	1385	1382	1382	1385	1385	1392	1395	1395	1397	1395	1395	
	.10	10	"	137	1375	1375	1377	1375	138	1365	1365	1365	1365	137	1365	1375	1377	1377	138	1377	138	
	.20	20	"	1342	1345	1345	135	135	135	134	134	1342	134	1342	134	1345	1347	1352	1352	1345	1347	
	.30	30	"	132	1322	1325	1325	1325	1325	132	1317	1317	132	132	1317	1326	1325	1335	1335	1322	1322	
	.40	40	"	1302	1305	1307	131	1307	1305	1297	1297	1297	1297	130	1297	1303	130.5	1307	1312	1302	1302	
	9.00	60	"	95		99		1002		997		1023		102		997		1025		102		Temp Reading
	.00	60	"	1277	1277	128	1282	128	128	127	1265	1265	1265	127	1262	1277	1277	128	1278	127	1273	P. D. Reading
	.20	80	"	1.247	1.257	1.255	1.257	1.255	1.255	1.25	1.25	1.245	1.245	1.247	1.242	1.25	1.25	1.252	1.252	1.245	1.25	

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
8/28/08	9.40	100	30	123	1235	1232	1235	1232	1232	1232	123.2	123	123	123	1222	1227	123	1232	123	1222	123	
	10.00	120	″	121	1222	1217	122	1217	1217	122	122	1215	1212	1212	1205	121	1212	1212	1215	121	1212	
	.20	140	″	119	1202	120	1202	1202	120	121	121	120	120	120	119	1195	1197	1197	1197	119	1192	
	.40	160	″	1175	119	119	119	1187	1185	120	120	1192	119	1187	118	1185	1185	1187	1187	118	1182	
	11.00	180	″	942		987		100		100		1022		1005		972		997		995		Temp Reading
	11.00	180	″	1155	1172	117	1175	117	117	1182	1182	118	118	1175	1172	117	1172	1175	1172	117	1172	P. D Reading
	.20	200	″	114	1162	1162	1165	1162	116	1177	1176	1175	117	1162	116	116	1165	1167	116	116	1162	
	.40	220	″	1122	115	115	1152	1152	1145	1167	117	117	116	1157	1152	115	1155	1157	1152	115	1165	
	12.00	240	″	96		995		100		100		1022		101		987		1002		100		Temp Reading
	1200	240	″	1102	113	113	1125	1132	1127	1152	1152	115	1145	114	1137	1137	114	114	1137	1137	1142	P. D Reading
	.20	260	″	1082	1115	1117	1125	112	1112	1135	1132	1135	113	1122	112	112	1127	113	112	112	113	
	40	280	″	1062	1092	110	1102	110	1095	107	10.0	1077	109	1102	110	1102	111	111	1105	110	1112	-140
	.44½	284½	″							100	50		″									
	.45½	285½	″																			-142.2
	.46½	288½	″									100										-142.7
	.49	289	″							50		50										
	.50	290	″	1.032	1.082	1.09	1.097	1.095	1.092				100	1.082	1.082	1.09	1.0017	1.10	1.045	1.092	1.10	-145
	.53½	293½	″										50									
	1.00	300	″	98.5		102		103		103.5		105.2		103.7		100		102.2		1.025		Temp. Reading
	1.00	300	″	1.04	1.072	1.077	1.082	1.08	1.08					1.032	1.037	1.07	1.072	1.077	1.07	1.067	1.07	
	.03	303	″																			-151.5
	.07	307	″											1.00	1.00							
	.07½	307½	″											.44	.50							
	.08½	308½	″																	1.00		-153.7
	.10	310	″	1.022	1.057	1.062	1.07	1.07	1.072												1.00	-154.2
	.12	312	″													1.032	1.00	1.045	1.032	.82	.895	-155
	.12½	312½	″																	.50		
	.13½	313½	″																		50	
	.15	315	″													1.00			.98			-156.7
	.16	316	″														.50					
	.19	319	″															1.00				-158
	.20	320	″	1.012	1.042	1.047	1.052	1.052	1.06							.50						
	.21½	321½	″															.79	—			
	.23	323	″	1.00														.50				
	.30	330	″	.977	1.012	1.012	1.015	1.022	1.037													-161.5
	.33	333	″		1.00																	-166.5

DATE	TIME	MIN.	AMP	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS.
8/28/08	1.33½	333½	30			100	100															-166.7
	.35	335	"	.955	.985	.985	.982	1.00	1.03													-167.5
	.40½	340½	"	90	.942	.937	.912	.957	1.02													
	.45	345	"				.50															
	.46	346	"						1.00													-173
	.46½	346½	"	.50																		
	.48	348	"		50	50																
	.49½	349½	"					.50	.98													
	.50	350	"						.978													
	.55	355	"						.94													
	2.00	360	"						.857													
	"			103.2		109		109.5														Temp.

Changed wiring to the mercury cups so that when a cell is short-circuited at zero, it will not affect the volt readings of the adjacent cells. The readings below 1 Volt on the preceding runs were some of them affected in this way.

Change #5

DATE	TIME	MIN.	AMP	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS.
8/28/08	P.M. 4.00	0	30	95		98		98		93.5		95.2		95.2		94.7		96.5		95		Temp.
	7.00	180	"	96.5		98.2		98.5		96		97		98		97		98		97.2		"
	10.00	360	"	95		957		977		98		997		1.00		99		101		1.00		"
8/29	A.M. 1.00	540	"	98.5		1.01		1.02		1.01		1.03		1.037		1.025		1.04		1.04		"
	4.00	720	"	99		1.02		1.03		1.025		1.03		1.04		1.032		1.042		1.04		"
	7.00	900	"	99		1.012		1.022		1.01		1.035		1.035		1.02		1.03		1.025		"
	7.00	"	"	184	1.84	1842	1845	183	1.83	183	1805	1805	181	181.5	1817	182	182	1815	182	182	1825	P.D Reading

(over)

DATE	At TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
								Discharge #5														
8/29/08	7.02 AM	—	open	159	1585	158	158	158	158	156	1557	156	156	1565	1565	1567	1565	157	157	1565	1567	
	7.05	0	20	150	1502	149	149	1485	1415	147	146	1465	1465	147	147	1475	147	147	1475	147	1475	
	.07	2	"	142	142	142	142	142	142	1405	1405	1405	1405	141	141	1417	1417	142	142	1417	1417	
	.10	5	"	139	139	139	1395	1395	140	13.8	13.8	138	1382	1385	139	139	1397	1397	1395	1395	1395	
	.15	10	"	1370	1377	138	138	138	138	1365	1365	1365	1365	137	137	138	138	138	138	138	1377	
	.25	20	"	136	135	135	135	135	1365	1335	1337	134	134	134	1342	1345	134	135	1352	1345	1345	
	.35	30	"	1335	133	133	133	1335	1337	1315	1315	1315	132	132	1322	1325	133	133	132	132	1322	
	.45	40	"	1305	1315	1315	1315	1315	1317	1297	1297	1297	1297	130	130	1305	1305	1312	131	1302	1302	
	8.05	60	"	96		99		995		99		1022		102		100		102		101		Temp Reading
	8.05	60	"	128	1282	1282	1282	1282	1285	127	1265	1265	1265	127	1275	1275	1277	128	128	1275	1275	
	.25	80	"	1257	126	1262	1262	126	1262	125	1252	125	1247	1252	1247	1252	1255	126	126	1252	1252	
	.45	100	"	1237	1242	1245	1247	1242	124	1235	1237	1232	1232	123	1227	1232	123	1237	1237	1227	123	
	9.05	120	"	95		98.5		98.5		97		997		995		977		99		975		Temp Reading
	9.05	120	"	122	123	123	1232	1227	123	1222	122	1217	1215	1215	1212	1217	1217	1222	1222	1222	1217	
	.25	140	"	1202	121	121	121	121	121	1207	121	1205	1202	1202	1197	120	120	1202	1202	1197	120	
	.45	160	"	1187	122	1207	120	119.5	1202	1197	1192	1192	1192	1192	119	119	119	1195	1192	1187	119	
	10.05	180	"	927		99		977		957		977		985		957		985		97		
	10.06	181	"	117	1182	1182	1185	1185	1182	1185	1187	1187	118	1177	1177	1177	1177	1182	1182	118	1177	
	.25	200	"	1157	117	1172	1172	1172	117	1175	1177	1177	117	117	117	117	117	1175	117	1167	1167	
	.45	220	"	1145	116	116	1162	116	116	117	117	117	1165	1162	116	1162	1162	1165	1162	116	116	
	11.05	240	"	95		101		995		975		1005		99.5		97.5		99		977		
	11.05	240	"	1125	1142	1142	115	1145	1145	115	1152	115	115	1145	1147	1142	1147	115	1145	1145	115	
	.25	260	"	1112	1132	1132	1137	1135	1132	113	1122	1132	113	113	1132	1132	1136	1142	1132	1132	113.5	
	.35	270	"	110	112	1125	113	1125	1125	1077	104	110	1112	112	112	112	1122	113	1122	112	122	

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	222	224	225	226	228	229	230	
8/29/18	1137½	272½	30								1.00											-136.2
	40	275	"							1.00												-137.5
	41	276	"																			
	42½	277½	"								50	100										-138.7
	43	278	"																			
	44½	279½	"							.50												
	45	280	"	109	111	1115	112	1115	1115			50	1062	1102	1102	1112	111	112	111.2	1112	111.2	-142
	49	284	"										100									
	51½	287½	"										50									
	.55	290	"	1.06	1.102	1.105	1.11	1.107	1.107					1.072	1.072	1.097	1.095	1.11	1.10	1.095	1.097	-148.5
	12.02	297	"											1.00								
	.02½	297½	"												1.00							-148.7
	.05	300	"											.50								
	.05½	300½	"	1.062	1.09	1.092	1.097	1.097	1.097						.50	1.07	1.06	1.085	1.077	1.06	1.062	
	.05	300	"	98.2		101.7		101.7		103		105.5		102.5		99.5	1.00	102		100.5	1.00	Temp. Reading -153
	.11	306	"																			
	.12	307	"																	1.00		-153.5
	.15	310	"	1052	108	108	1085	1082	109							1.00	54	106	1052	58	50	-15.5
	.15½	310½	"														40			50		
	.16	311	"																			
	.18	313	"																			
	.21½	316½	"													50						
	.22	317½	"																100			-158.2
	.25	320	"															100 50	50			-158.5
	.26	321	"	102	1052	1057	1.06	1.06	107													
	.33	328	"	1.00																		
	.35	330	"	987	1032	1032	1032	1035	106													-164
	.39½	334½	"				100															
	.40	335	"			100																-167.2
	.40½	335½	"		100																	-167.5
	.41½	336½	"					100														-167.7 -168.2
	.45	340	"	.877	.97	.942	.897	.952	1.037													
	49½	343½	"																			
	.49	344	"	.50			.50															
	.51	346	"			.50		.50														
	.53	348	"		.50																	
	.54	349	"																			
	.55	350	"						1.00													-174.5
	1.02½	357½	"						.997 .92													

Sunday — Cells Stood Idle 29 Hours.

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
						Charge #6																
8/30/08	PM 6.00	0	3.0	83.7		83.7		83.7		83.7		83.7		83.7		83.7		83.7		83.7		Temp
	9.00	180	"	92		93		93.2		93		93		93.2		93		93		93		
8/31	AM 12.00	360	"	95.5		96.3		97.2		98		99		99.4		97.5		97.7		97.8		
	3.00	540	"	99.5		1007		102		1047		104		103		102		103		103		
	6.00	720	"	97.2		1007		101		100		1022		102		101		101.5		1002		
	9.00	900	"	1007		102.5		104		1022		1042		104.5		103		1047		103.5		
	9.00	"	"	182	182	1825	1822	182	1817	1797	1795	1795	180	1802	1802	1805	181	1802	1812	182	181	
						Discharge #6																
8/31	AM 902	—	o/ckt	158	158	1575	1575	1572	1575	155	1555	1552	1557	156	156	1567	156	1565	157	156	156	
	.05	0	30	148	148	1477	1477	1477	1477	146	1457	146	146	146	146	1465	1465	147	1465	1465	146	
	.07	2	"	1422	1422	1422	1422	1425	1427	141	141	141	141	1415	142	142	142	1425	1422	1422	142	
	.10	5	"	139	139	139	1392	1397	1397	138	1382	139	139	1392	139	139	140	140	140	140	140	
	.15	10	"	137	137	1372	1377	1377	138	1362	1365	1367	1367	137	137	1377	138	138	138	138	1375	
	.25	20	"	135	135	135	135	1355	1357	1337	134	134	134	1347	1347	135	1355	136	136	135	1352	
	.35	30	"	132	133	133	133	133	1335	131	1312	1327	1317	1322	1322	133	133	1337	1335	133	133	
	.45	40	"	1312	132	132	132	132	132	1305	1302	130	130	131	1307	1312	1317	132	132	1312	1312	
	10.05	60	"	99		1025		103		101		1022		104		103		1045		1037		Temp
	10.05	60	"	1287	1292	1292	1297	1297	1297	1275	1277	1275	1275	128	128	1285	129	129	129	128	128	
	.25	8.0	"	1262	127	127	127	127	127	1257	1257	1255	1255	1257	1257	126	126	127	1267	126	126	
	.45	10.0	"	1245	1257	1257	1255	1257	1257	124	124	124	124	124	124	1247	1247	125	125	1242	124	
	11.05	1.20	"	99		1022		1025		1022		104		105		1037		105		1042		Temp
	11.05	120	"	123	1237	1237	1237	1237	124	123	123	1222	1222	1225	1225	1232	1232	1235	1232	1222	123	
	.25	140	"	122	1222	1222	1222	1222	1225	1217	1217	1215	1212	1212	1212	1217	122	1222	122	121	1212	
	.45	16.0	"	1202	121	121	121	121	1212	1207	1207	1205	1205	1202	1202	1205	121	1207	120	120	120	

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
8/31/08	1205	180	20	101		1045		105		1.03		106		1062		105		1045		104		Temp
	12.05	180	"	119	1202	120	120	120	120	1197	1197	1195	1195	119	119	1192	120	120	1192	119	1192	
	.25	200	"	1177	1187	119	119	119	119	1185	1185	1187	1185	1182	118	1182	1185	119	1185	1182	1182	
	.45	220	"	1167	1177	1177	1177	1177	1177	118	118	1182	1177	1175	1172	1175	1177	1182	1177	117	1175	
	1.05	240	"	1045		1065		107		1055		107		1075		1055		106		106		Temp
	.05	240	"	1152	1165	1165	117	1165	1165	117	117	117	117	1165	1167	1167	117	117	1167	1162	1167	
	.25	260	"	1137	115	115	1155	1152	1152	115	1155	1157	1152	1152	1152	1157	116	1162	1155	1152	116	
	.45	280	"	1125	114	114	1142	114	114	101	100	113	113	114	114	1142	1145	115	114	114	1145	-140
	.45½	280½	"							100												-140.2
	.48	283	"								50											
	.48½	283½	"							50												
	.55	290	"	1117	1132	1135	1135	1135	1135			101	108	113	1125	113	1137	1137	1135	1132	1127	-145
	.58	293	"									50										
	2.00	295	"										100									-147.5
	.02	297	"										50									
	.05	300	"	1062		1082		1077		1085		112		111		109		110		109		Temp
	.05	300	"	1105	1122	1125	113	1125	1127					1105	1097	112	112	113	112	112	1122	
	.14½	309½	"												100							-154.7
	.15	310	"	1095	1117	1117	1122	1117	112					1037	93	110.2	1105	112	111	1105	1102	
	.17½	312½	"											100	50							-156.2
	.20	315	"											50								
	.25	320	"	108	1102	1105	1105	1102	111							106	106	11.0	1092	10.72	104	
	.27½	322½	"																		100	-161.2
	.30	325	"														100					-162.5
	.30½	325½	"													100						-162.7
	.31	326	"																			
	.32½	328½	"																		50	
	.34	329	"														50					
	.34½	329½	"																	100		-164.5
	.35	330	"	106	11.8	109	1087	1085	1097							50						
	.43½	338½	"															107	106	87		
	.45	340	"	1027	1062	1067	106	106	1082										100			-169.2
	.47	342	"															100	92			-170
	.48	343	"																50			
	.50	345	"	100														50				
	.55	350	"	94	102	1022	100	102	107													-172.5
	.57½	352½	"		100	100		100														-175
	3.00	355	"	50																		-176.2
	.02	357	"				50															
	.05	360	"		78	67		50	104													

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
	3.05	360		113		1135		1135		108		109		1125		113		1142		1145		Temp
8/31/08	3.06	361	30			50																
	.07	362	"		50																	
	.15	370	"						10.0													- 1.85
	.25	380	"						87													
	.29	384	25						71													
								Charge #7														
8/31	PM 5.15	0	30	1015		1047		104		99		995		1015		102		103		103		Temp
	8.15	180	"	100.2		102		101.7		99.7		101		101.2		101.2		102.5		102.7		"
	11.15	360	"	99		101		1005		1017		102		1027		1017		1032		103		"
9/1	AM 2.15	540	"	102		105		106		1055		108		107		106		1075		107		"
	5.15	720	"	102		1025		1065		105		1075		1092		107		109		108	← [illegible]	"
	8.15	900	"	102		1055		1065		105		1077		1077		1065		1075		1067		"
	8.15	900	"	1825	1822	1817	181	1807	1807	1785	178	1782	179	179	179	1802	179	180	180	1795	180	P.D.
								Discharge #7														
9/1	A.M. 8.18	—	open	157	157	157	157	156	1565	154	154	154	154	154	155	155	155	155	156	1552	1552	
	.20	0	30	147	147	1465	1465	1465	1465	144	144	144	144	1445	1445	1445	1445	1445	1445	144	144	
	.23	3	"	1397	1397	140	140	140	140	138	1385	1385	1385	1387	139	1395	1395	140	1395	1395	1395	
	.26	6	"	1375	1377	138	138	138	1385	1367	1367	137	137	1375	1375	138	138	138	138	138	1377	
	.30	10	"	1362	1365	1367	137	137	1372	1352	1352	1355	1355	136	136	1362	1365	1365	1367	1365	1367	
	.40	20	"	1342	1342	1345	1345	1347	135	1327	1327	133	133	1332	1332	1342	134	1342	1347	1327	1327	
	.50	30	"	132	1322	1322	1327	1327	133	1305	1305	1305	1307	1312	1312	1317	1317	1325	132	1315	1315	
	9.00	40	"	1302	1305	1307	131	1312	1315	129	129	129	129	1297	1295	131	130	1307	1305	130	1297	
	.20	60	"	100		103		104		1032		106		10.6		1035		1052		1047		Temp
	.20	60	"	128	1282	1285	1287	1285	1287	1265	1265	1265	1265	1267	1267	127	1272	128	128	127	127	
	.40	80	"	126	1262	1262	1262	1262	1262	1242	1242	1247	124	124	1245	1247	1252	1252	1252	1245	1245	